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PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 C.F.R. § 1.53(b)(2).

Attorney Docket Number: 2433.26US01

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TITLE OF INVENTION (280 characters max)

MOVABLE HIGHWAY SIGN

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ENCLOSED APPLICATION PARTS (check all that apply)

- ☒ Specification Number of Pages: 13
- ☒ Drawings Number of Sheets: 9
- ☒ Applicant(s) is/are entitled to small entity status in accordance with 37 CFR 1.27.
- ☐ CD-ROM or CD-R in duplicate, and Compact Disc Transmittal
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☒ A check in the amount of $80.00 is enclosed to cover the provisional application filing fee. The Commissioner is hereby authorized to charge any additional filing fees and/or to credit any overpayment to our Deposit Account Number 16-0631.

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☒ No. ☐ Yes. The name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

Michael Bondi

Date: 04/22/04

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Docket No. 2433.26US01

MOVABLE HIGHWAY SIGN

Field of the Invention

The present invention relates generally to road signs. More particularly, the present invention relates to electronic changeable message signs.

Background of the Invention

Road signs are used in a variety of applications to assist drivers in finding particular locations or to warn drivers about potential hazards. In situations where it is not needed to periodically change the road signs, the text or logo is affixed to the road sign.

Road signs have also been developed that permit the message conveyed by the road sign to be easily changed. For example, some road signs include a cylindrical drum with several messages printed on the drum. Rotating the drum allows the messages to be changed.

Another type of changeable road sign includes an array of light emitting diodes that may be selectively illuminated to create desired messages. It will be appreciated that this type of sign provides a significantly greater degree of flexibility than static or rotating drum road signs.

These preceding types of changeable road signs require significantly more maintenance than the road signs that have static messages. For example, the operability of the arrays of light emitting diodes must be periodically checked to ensure they are all

working as an incorrect message may be displayed if some of the light emitting diodes are not working.

To assist drivers in viewing the road signs, a preferred location for road signs is above a portion of the road on which vehicles drive. This configuration enables drivers to read the messages on the road signs without lateral turning and, as such, is often perceived as being safer than road signs that are on adjacent sides of the road.

When road signs are positioned above the road, tasks associated with maintaining the road signs become more difficult. One option is to temporarily close the portion of the road under the road sign. Indeed in many locations this is mandated by law. This option is undesirable as changes in normal traffic flow patterns often increase congestion on the road and may lead to more accidents.

Another option for maintaining road signs that are positioned over roads is to work on the road signs without interfering with the flow of traffic on the road by having the person doing the maintenance climb up to the road sign. In light of the enhanced danger of a person working over a road that is in use, there are numerous safety precautions that must be followed to reduce the potential of injury to the person and in many locations the roadway below the work area is required to be closed.

This option also potentially increases the risk of damage to vehicles traveling under the road sign if the person performing the maintenance activities was to inadvertently drop parts or tools onto the road.

Certain electronic changeable signs where the sign enclosure is large enough for a worker to enter the enclosure do not require shutting down traffic. These signs, however, are massive in size and weight and may require environmental control

such as air conditioning. The weight, size and expense of these make such signs impractical in many locations.

Summary of the Invention

The present invention is directed to a movable sign system having a sign module and positioning system with the sign system mounted on a support structure. The movable sign system is particularly suited for mounting above a road such as on a bridge or existing sign structure.

The sign module is movable with respect to the support structure between a use position that is at least partially above the road to a maintenance position that is adjacent the road. In an alternate embodiment where the sign is attached to a bridge structure, the sign is raised and is positionable to be accessed from the walkway or road surface on top of the bridge. The movable sign system thereby enhances the ability to maintain the sign module without the risks associated with working above a road in which vehicles are driving.

Description of the Drawings

Fig. 1 is a front elevational view of a movable sign system according to an embodiment of the present invention with a sign module in a use position above a road.

Fig. 2 is a front elevational view of the movable sign system of Fig. 1 with the sign module in a maintenance position adjacent the road.

Fig. 3 is a side elevational view of the movable sign system of Fig. 1.

Fig. 4A is a front elevational view of an alternative embodiment of the movable sign system with a sign module in a use position above a road.

Fig. 4B is a front elevational view of an alternative embodiment of the movable sign system with a sign module in a use position above a road.

Fig. 5 is a front elevational view of the movable sign system of Fig. 4A with the sign module in a maintenance position.

Fig. 6 is a front elevational view of another embodiment of the movable sign system with a sign module in a use position.

Fig. 7 is a top plan view of the movable sign system of Fig. 6 with the sign module in the use position.

Fig. 8 is a side elevational view of an end plate of the movable sign system.

Fig. 9 is a top elevational view of another embodiment of the movable sign system.

Fig. 10 is a front view of another embodiment of movable highway sign.

Fig. 11 is a front view of a support structure for the movable highway sign illustrated in Fig. 10.

Fig. 12 is an upper first side view of the movable highway sign illustrated in Fig. 10.

Fig. 13 is a lower first side view of the movable highway sign illustrated in Fig. 10.

Fig. 14 is a second side view of the movable highway sign illustrated in Fig. 10.

Detailed Description of the Invention

The present invention is directed to a movable sign system 10 that is particularly designed for placement at least partially above a road 12, as illustrated in Fig. 1. The movable sign system 10 generally includes a sign module 14 and a positioning system 15 mounted on a support structure 16. The support structure can be, for example, a bridge 17 with the outline indicated by to dot-dashed lines of Fig. 1 or a cantilever sign support structure 18 illustrated in Fig. 2.

The movable sign system 10 of the present invention enhances the ability to maintain the sign module 14 as the sign module 14 is movable between a use position (Fig. 1) that is above the road 12 to a maintenance position (Fig. 2) that is adjacent a side of the road. By moving the sign module 14, risks associated with working above a road are eliminated compared to conventional road signs.

The sign module 14 used in conjunction with the present invention preferably has a substantially rectangular configuration with an upper edge 20, a lower edge 22 and a pair of side edges 24 that extend between the upper edge 20 and the lower edge 22. The sign module will be powered and may have a sign controller 25 located remote from the module and connecting by cables 25.

The sign system is suited for use with a variety of electronic changeable sign configurations. See the configurations of, for example, U.S. Patent Nos. 6,150,996 and 5,914,698, which are incorporated herein by reference and are owned by the owner of the instance application.

Examples of particularly suited changeable signs are disclosed in U.S. Patent Nos. 6,414,650; 6,175,342; 6,150,996; and 5,914,698, which are all assigned to the assignee of the present application. It is also possible to use other types of changeable electronic signs in conjunction with the concepts of the present invention.

The positioning system 16 preferably includes an upper rail 40 and a lower rail 42 comprising a track 43. The upper rail 40 and the lower rail 42 each may have a recess or other engagement means formed therein that is adapted to receive wheels 44 m4 mounted on the sign module 14. The positioning system will preferably include a powered drive system such as a rotatable threaded rod 49 and nuts fixed with respect to the sign module. An alternative system could include pneumatic cylinders. An alternate embodiment could be a chain drive 54 such as illustrated in Fig. 2. Manually driven systems may be suitable in some locations utilize, for example, hand cranks.

The upper rail 40 and the lower rail 42 are preferably sufficiently long so that the sign module 14 is positioned substantially above the road when in the use position and adjacent a side of the road when in the maintenance position. This configuration enables maintenance to be performed on the sign module 14 without the person performing the maintenance being above the road when performing such maintenance.

In an alternative embodiment of the present invention, the movable sign system 110 includes a sign module 114 that is pivotally mounted by way of a positioning system 115 configured as pivots to a support structure 116, as illustrated in Figs. 4A and 5. This embodiment of the movable sign system 110 is particularly suited for relatively narrow areas where it is not possible to slide the sign module 114 to a position adjacent

the road as is described in the embodiment illustrated in Figs. 1-3. Referring to Fig. 4B a slightly modified version having an extension structure configured as swing arms 121.

The sign module 114 used in these embodiments of Fig. 4A, 4B and 5 may have a variety of configurations such as is discussed above with respect to the embodiment illustrated in Figs. 1-3.

The 4A embodiment has a positioning system 116 including an end plate 140 pivotally attached to one of the ends of the sign module 114. The plate is suitably attached to a bridge or free standing sign support structure. The end plate 140 preferably includes an upper tab 142 and a lower tab 144 extending therefrom. In their most simplistic form, the upper and lower tabs 142, 144 each include an aperture formed therein. The sign module 114 connects to the support structure 116 by extending bolts 148 or similar devices through the apertures and into the sign module 114.

Mounting points 150 on the sign module 114 are preferably located proximate the side on the upper and lower edges 120, 122 of the sign module 114.

Opposite the mounting points 150, the support structure 114 preferably includes a locking mechanism 154 for maintaining the sign module 114 in a stationary relationship to the support structure 116 when in the use position and in the service position. In its most simplistic form, the locking mechanism 154 preferably includes an outwardly extending plate 156 having an aperture formed therein. A bolt 160 or similar device extends through the aperture and into the sign module 114 to attach to a suitable anchoring position on the bridges or other support structure.

Depending on the size of the sign module 114, it is possible to use mechanical assistance (not shown) and power driven systems when moving the sign

module 114 from the use position (Fig. 4) to the maintenance position (Fig. 5). Suitable drive mechanisms would cable, belt, gear, or chain systems, all of which can be powered manually or by motors or hydraulic cylinders or pneumatic cylinders,

In another embodiment of the present invention, the movable sign system 210 includes a sign module 214 that is mounted for rotation with respect to a positioning system 216, as illustrated in Figs. 6-7. This embodiment of the movable sign system 210 is particularly suited for use with a bridge B that extends over the road.. The sign modules translates vertically and then rotates, swings, or moves horizontally to allow service from on top of the bridge.

The sign module 214 used in this embodiment may have a variety of configurations such as is discussed above with respect to the embodiment illustrated in Figs. 1-3.

The support structure 216 includes at least two members that are each vertically moveable with respect to a side of the bridge proximate opposite edges of the sign module 214. In their most simplistic form, the end members 240 each have an aperture formed therein. The sign module 214 connects to the positioning system 216 by extending pins, bolts 244 or similar devices through the apertures and into the sign module 214. The end members 240 may telescope with the lower members 215 or may be slidingly mounted thereto, or may otherwise be mounted such that the sign moves from the use position 245 to the service position 246.

Mounting points on the sign module 214 are preferably proximate a middle of the sign module 214 so that the sign module 214 is approximately equally weighted above and below the mounting points. Arranging the mounting points in this

manner makes is relatively easy to manually move the sign module 214 from a use position (Fig. 6) to a maintenance position.

Depending on the size of the sign module 214, it is also possible to use mechanical assistance (not shown) when moving the sign module 214 from the use position to the maintenance position. One such suitable device would be a hydraulic cylinder.

In contrast to the preceding embodiments of the movable road sign where the sign module remains in an upright orientation in the use position and the maintenance position, in this embodiment, the sign module shifts from an upright orientation in the use position to an upside down orientation in the maintenance position.

Depending on the difference of height between the use position and the maintenance position, it is also possible to form the end members 240 with a vertically oriented slot 260, as illustrated in Fig. 8. When in the use position, the sign module 214 is proximate a lower end of the slot 260. When in the maintenance position, the sign module 214 is proximate an upper end of the slot 260.

Because the configuration of the movable sign module 214 in Figs. 6, 7 and 8 would require raising and lowering of the sign module 214, this embodiment preferably includes a mechanical assistance mechanism (not shown) to move the sign module 214 from the use position to the maintenance position.

In still another embodiment of the present invention, the movable sign system 310 has a sign module 314 that has a positioning system 315 mounted for shifting with respect to a support structure 316, such as is illustrated in Fig. 9.

The sign module 314 used in this embodiment may have a variety of configurations such as is discussed above with respect to the embodiment illustrated in Figs. 1-3.

The support structure 316 includes a first side member 340 and a second side member 342. The first and second side member 340, 342 each preferably include an upper connection point 344 and a lower connection point (not shown).

The sign module 314 is preferably connected to the positioning system 316 with a pair of upper elongate members 350 and a pair of lower elongate members (not shown). A first end of the upper elongate members 350 is pivotally attached to the upper connection point 344 on the first and second side members 340, 342. A second end of the upper elongate members 350 is pivotally attached to the upper edge 320 proximate opposite ends of the sign module 314.

Similarly, a first end of the lower elongate members is pivotally attached to the lower connection point on the first and second side members 340, 342. A second end of the lower elongate members is pivotally attached to the lower edge 322 proximate opposite ends of the sign module 314.

Depending on the size of the sign module 314, it is possible to use mechanical assistance (not shown) when moving the sign module 314 from the use position to the maintenance position. Such suitable devices would include hydraulic cylinders, pneumatic cylinders, chain drivers, gear drivers, cables, etc.

Another embodiment of the movable highway sign 410 that generally includes a sign module 414, a positioning system 415 and a support structure 416, as generally illustrated in Figs. 11-15. The sign module 414 used in conjunction with this

embodiment preferably includes a plurality of light elements that may be selectively illuminated to form a message on the sign module 414.

The support structure 416 has a generally square profile that is defined by a plurality of support beams 418. The support beams 418 provide the support structure 416 with sufficient structural rigidity so that the support structure 416 remains substantially stationary when extending over a road (not shown)

The positioning system 415 is preferably similar to a mechanism used for mounting barn doors and hangar doors. The positioning system 415 generally includes an upper rail 440 and a lower rail 442, as most clearly illustrated in Figs. 13 and 14.

The upper rail 440 and the lower rail 442 each preferably include a recess 443, as most clearly illustrated in Fig. 13. The recess 443 permits a wheel 444 or similar device to move with respect to the upper rail 440 or the lower rail 442 while retaining the wheel 444 or similar device in relation to the upper rail 440 or the lower rail 442.

A bracket mechanism 445 is used for attaching the wheel 444 to the sign module 414. A person of ordinary skill in the art will appreciate that the size and complexity of the bracket mechanism 445 is selected based upon the size and weight of the sign module 414. The bracket mechanism 445 preferably includes at least one vertically oriented beam 448 that extends from a lower edge of the sign module 414 to an upper edge of the sign module 414.

Movement of the sign module 414 with respect to the support structure 412 is preferably controlled by attaching a cable 450 to one side of the sign module 414, as most clearly illustrated in Figs. 12 and 14. The cable 450 is preferably connected to a

motor 452. Such a mechanism enables the sign module 414 to be readily moved from the use position to the maintenance position.

In many applications, the sign module 414 includes at least one electrically operated component such as a light emitting diode. Power is provided to the sign module 414 using a power cable 454, as illustrated in Figs. 12 and 15.

Depending on the distance the sign module is moved between the use position and the maintenance position, the power cable 454 may be tethered at one or more tether points 456 to reduce the potential of the power cable 454 being damaged when the sign module 414 between the use position and the maintenance position. The tether points 456 are preferably slidable along a rail 458.

It is contemplated that features disclosed in this application, as well as those described in the above applications incorporated by reference, can be mixed and matched to suit particular circumstances. Various other modifications and changes will be apparent to those of ordinary skill.

CLAIMS:

1. A movable sign system as described herein.

2. A method of installing and maintaining a movable sign system as described herein.

3. A method of servicing an electronic changeable message sign as described herein.

4. The apparatus, the methods, the systems disclosed herein.

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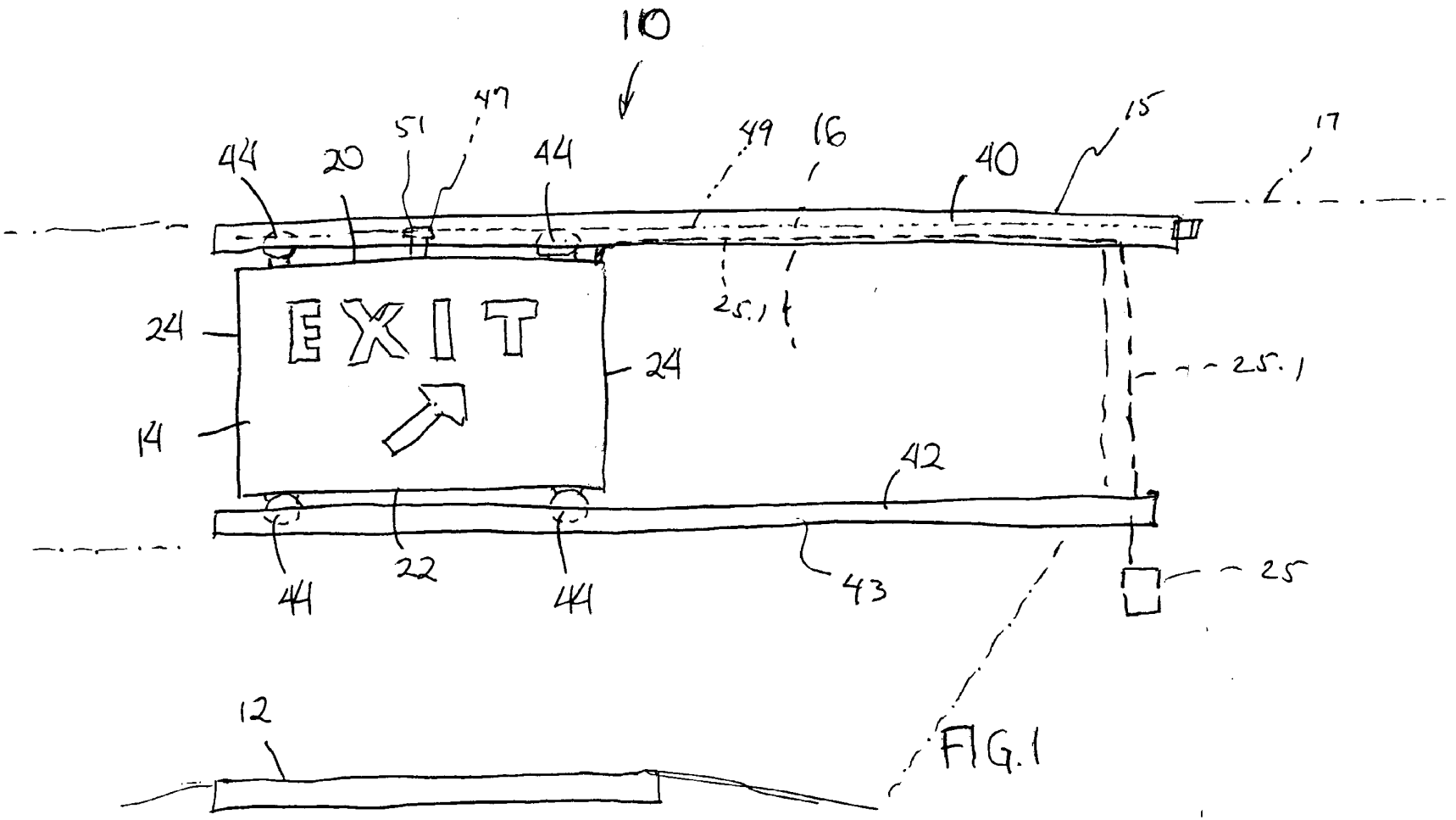
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FIG. 1

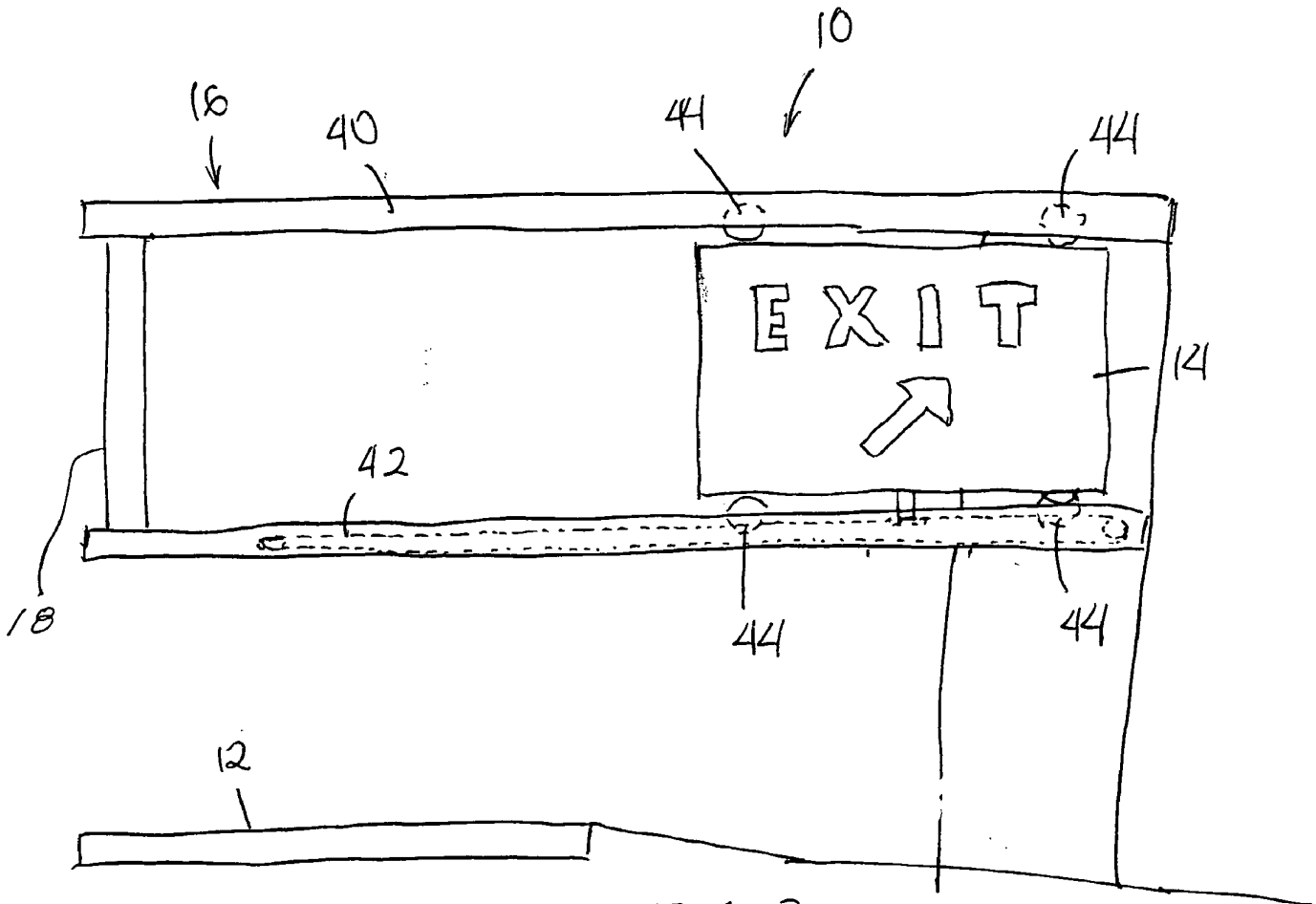

FIG. 2

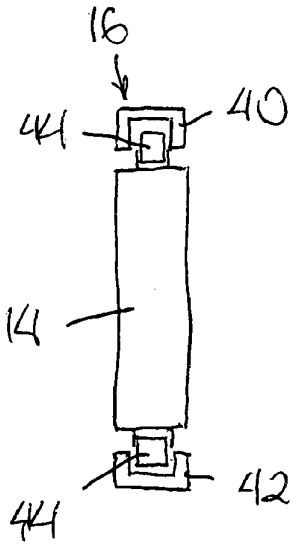

FIG. 3

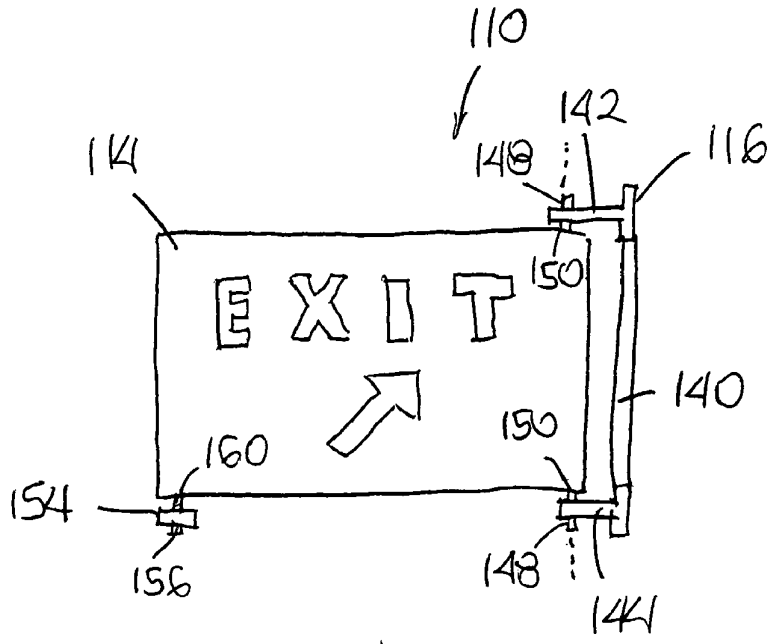

FIG. 4A

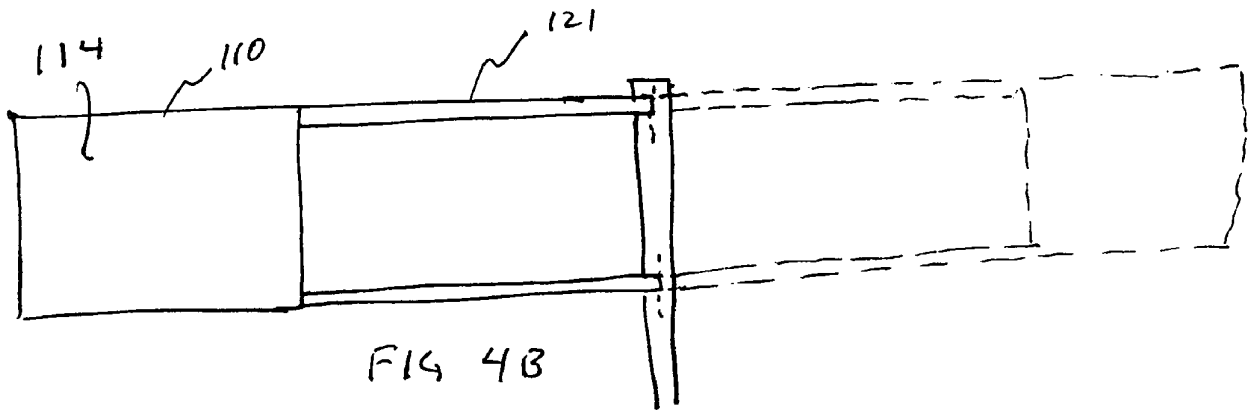

FIG 4B

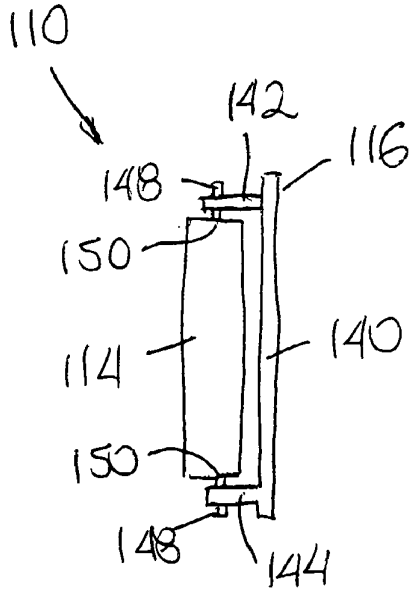
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FIG. 5

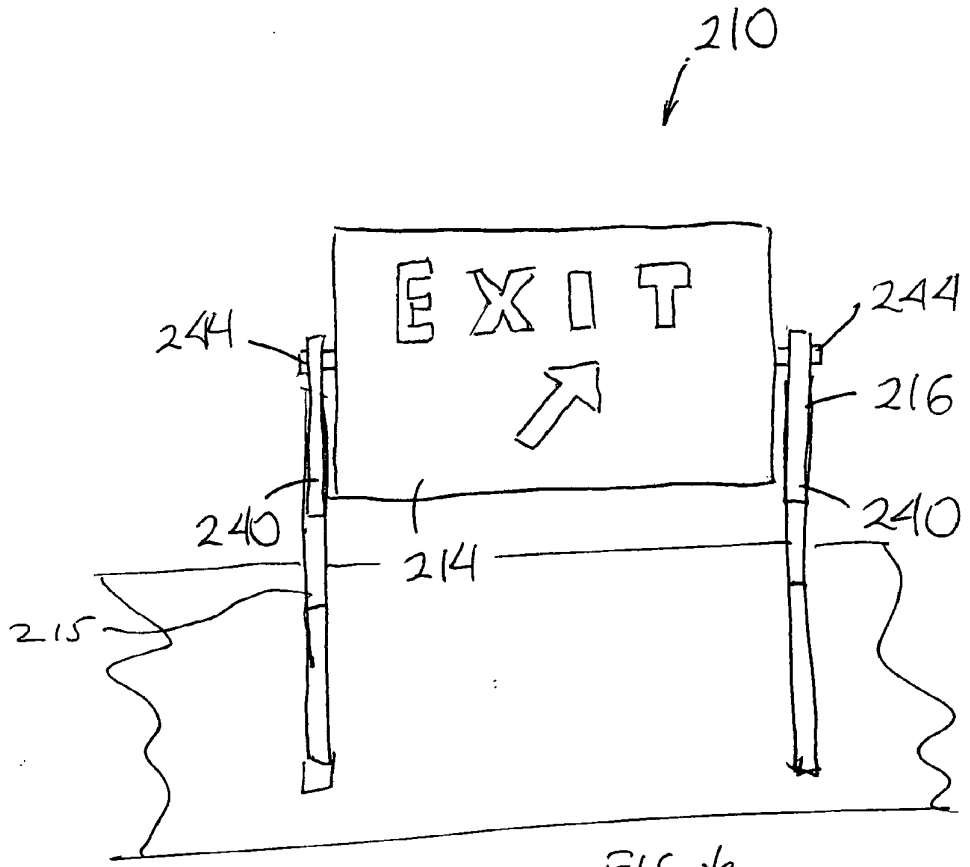
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FIG. 6

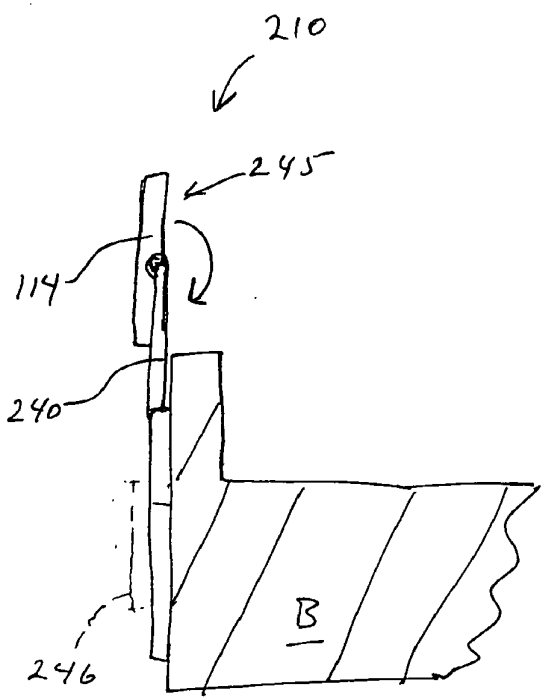

FIG. 7

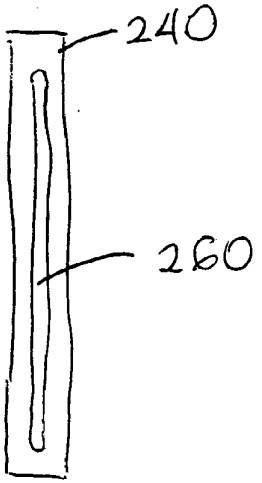

FIG. 8

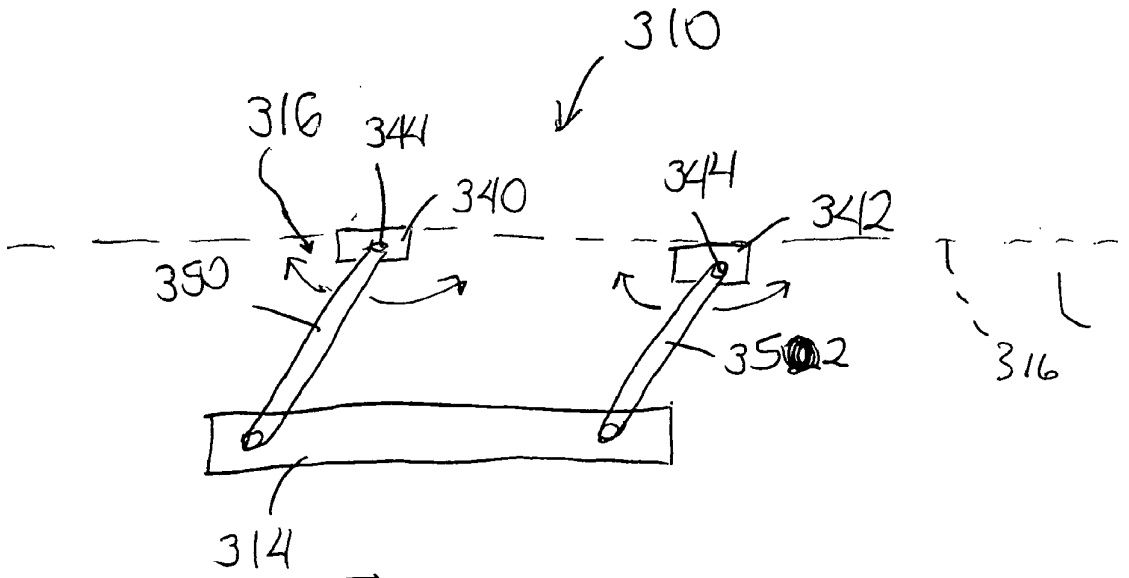

FIG. 9

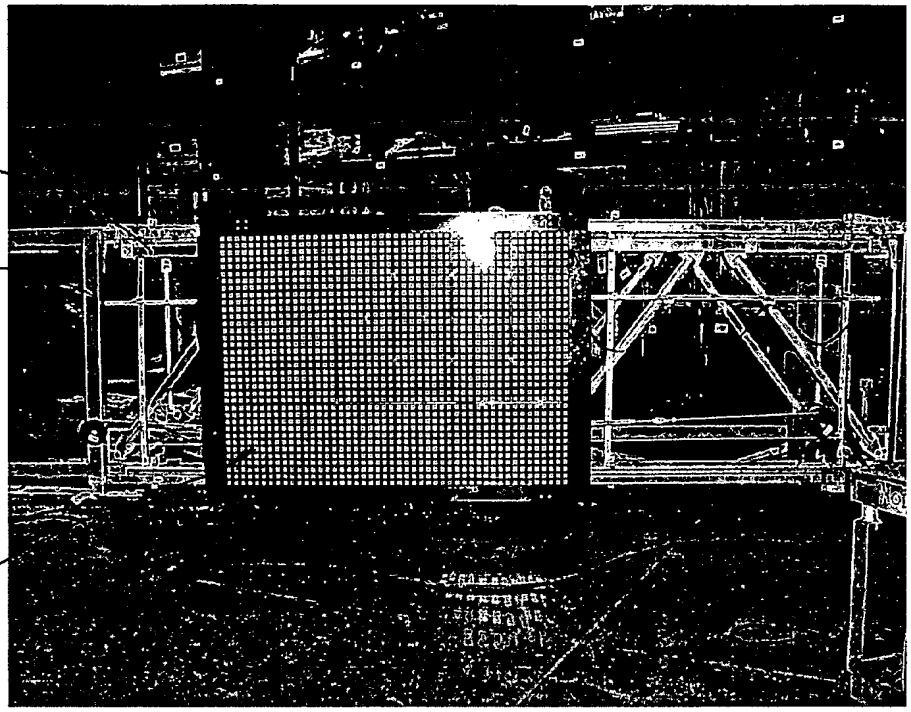

Fig. 11

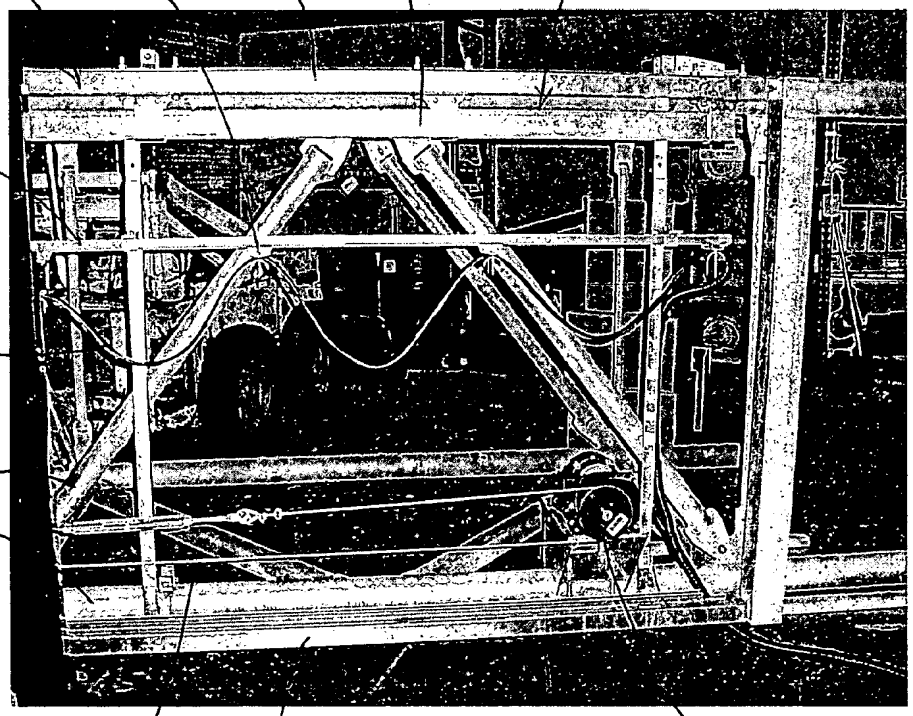

Fig. 12

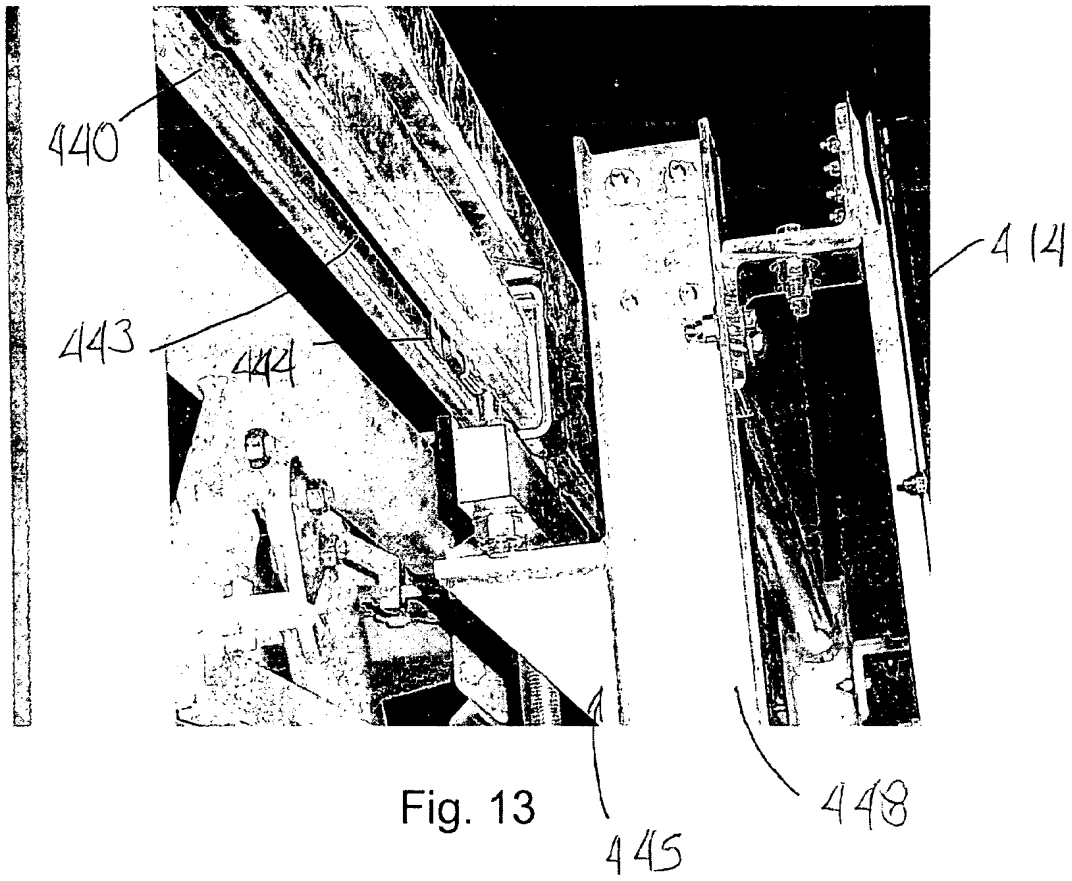

Fig. 13

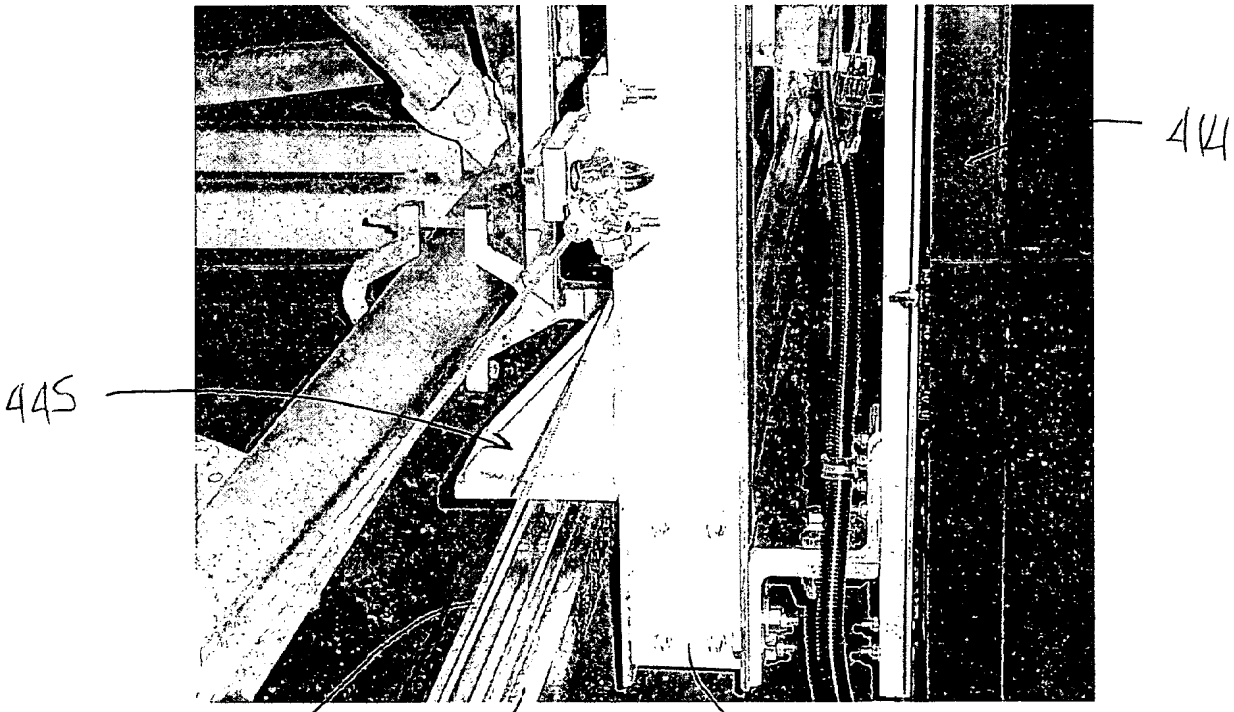

Fig. 14

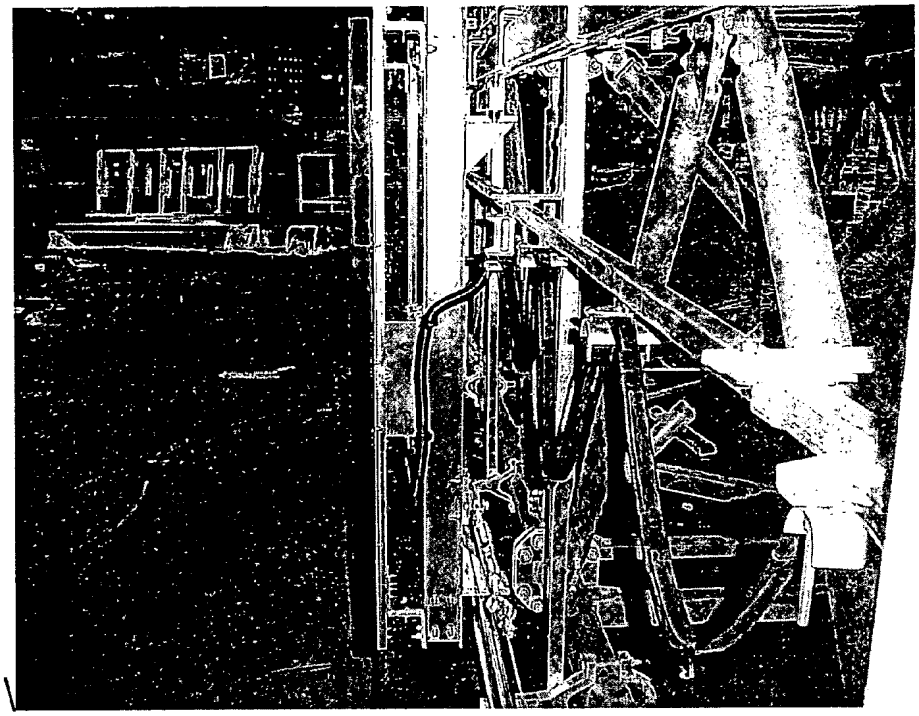

Fig. 15